Takasi Tuyama* & Yasuhiro Asai**: **On the true status of *Erigeron canadensis* L. var. *levis* Makino (1)**

津山 尚*・浅井康宏**: ケナシヒメムカシヨモギの分類学的地位について (1)

In this short note, we discuss in detail the true status of a weed that is passing in Japan as *Erigeron canadensis* L. var. *levis* Makino. The history of this weed in Japan is neither so long nor so complicated. In fact, this was first found out by Makino and (? Yamadori) in 1919, and at present, became widely established in our area of the warmer climate, ranking itself as an important member of the Japanese flora. Yet, very few taxonomists have paid attention to this weed, because of their general tendency not to evaluate the weeds as material of the plant taxonomy, and also because of the difficulty to settle the correct scientific names for them, especially in those plant group, in which the species and genera are so often confused each other. Is there any reason that the study of such a ubiquitous weed like this is of minor merit? Is it not much more important to us in the vegetational survey, and in any other fields of botany, not to speak of our concerns in the everyday life?

Makino's original description for this variety in Journ. Jap. Bot. **3**: 26, 1926, is very short one, only mentioning that "Stem and leaves glabrous. Flowers later than the type". It is very regrettable that the type specimen of Makino is not yet found out in Makino Herbarium of the Tokyo Metropolitan University in spite of Dr. M. Mizushima and others' efforts in search of the specimen, nor in any other herbaria like those of the University of Tokyo and the National Science Museum, Tokyo. Very short as it is, Makino's description has seldom misled the Japanese botanists in the identity of this weed, we believe, owing to the aberrant general appearance of the plant apart from *E. canadensis*. Makino, later in 1933, wrote that the variety had appeared de novo in Japan, but most botanists have been in doubt about his words. Recently, Hara, in his Enum. Spermat. Jap. **3**:

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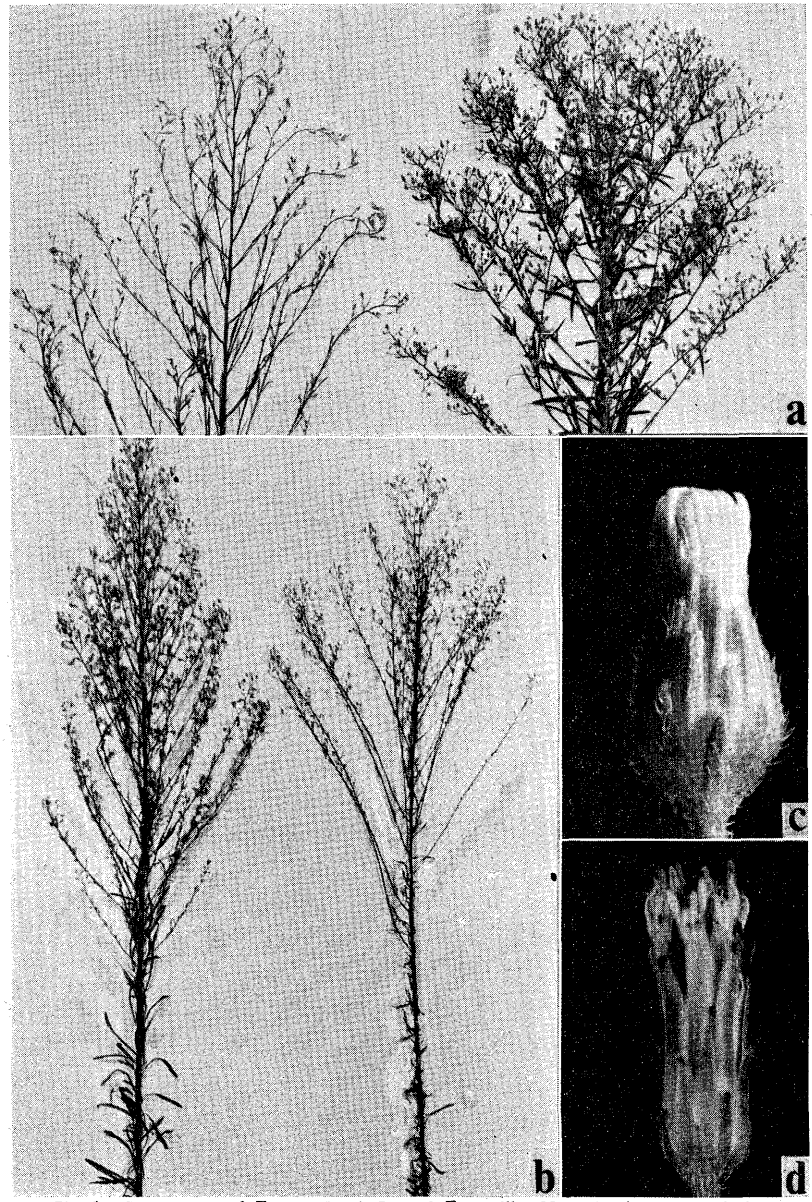

Fig. 1. Comparison of *E. canadensis* L. and *E. pusillus* Nutt. (=*E. canadensis* L. var. ***levis*** Makino). a. right, b. left, and c. *E. canadensis* L. a. left, b. right, and d. *E. pusillus* Nutt. c. & d. ×ca 20. All photographed from the specimen of Kugenuma, Kanagawa Pref. by Asai.

197, suggested that this might be an introduced weed from the United States, and provisionally assigned it to var. *glabratus* A. Gray under the same species. However, our view as concerns the correct name of this plant is different from all above. The weed is, we consider, very nearly related to, but specifically distinct from *E. canadensis* L., because of the manifold and essential differences between the two as well in the external features as even in the microscopic details in the floral structures, and, in addition, the fact that we have not at present met with any intermediate forms. Finally, we became to know that this weed is most likely referrable to *E. pusillus* Nutt., which was first described in the United States, but presumably, of South American origin. The following key characters will serve to distinguish the two species in the field and in the herbarium as well. Also, a simplified synonymy of the species in problem is given at the end of this note.

Now, we will come back to the original description of *E. pusillus* Nutt. in Nuttall's The Genera of North American Plants, **2**: 148–149 (1918), and that of *E. canadensis* preceding the former in the same printed page of Nuttall's. His descriptions read as follows:

"16. *canadensis*. Stem erect, hirsutely pilose, and much branches paniculate;

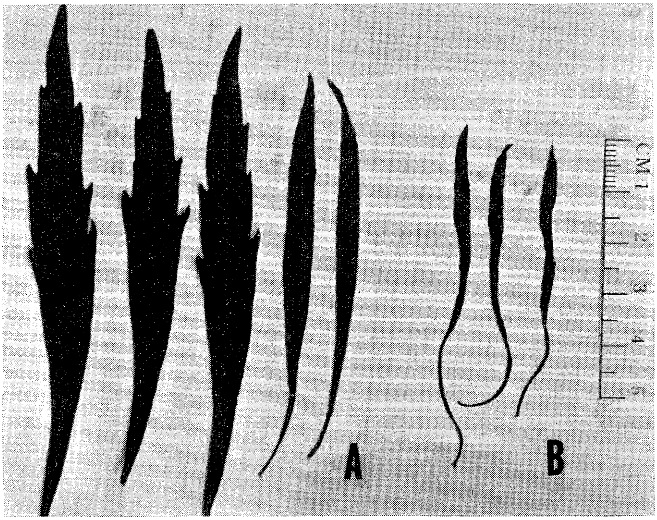

Fig. 2. Comparison of leaves from both A. *Erigeron canadensis* L. and B. *E. pusillus* Nutt. at the same places, and of the same developmental stages on the main stem. Photographed from the specimen collected at Kugenuma, Kanagawa Pref. by Y. Asai.

leaves linear lanceolate, ciliate; radical toothed. Hab. A most common weed, extending throughout North America and Europe.

17. **pusillum*.[1] Erect, low and slender; stem smooth; panicle nearly simple, peduncles almost naked, filiform and divaricate; leaves lanceolate linear, all entire, margin scabrous; discal florets 4-cleft. Hab. in New Jersey or Pennsylvania, common; passing for a minute variety of the preceding, from which it differs in several particulars which are sufficiently constant. From 4 to 6 inches high, the preceding from 2 to 6 feet; in this the panicle is simple with a fastigiate tendency, the ramuli naked, or merely squamose, and elegantly divaricate, each perfecting 2 or 3 flowers."

In these descriptions, the distinction between the two are fairy well represented, compared with any other later descriptions. Only the exception is concerning the total height of the plant, as well as the simpleness of the panicle in the latter species. We must bear in mind that *E. pusillus* Nutt. is the plant of rather a warmer habitat and that the specimens he studied were from New Jersey and Pennsylvania to where the plant might have been then casually introduced from the more southern region. Surely, the specimens were the depauperated ones. One point that is dubious in his description of *E. pusillus*, it seems, is the phrase, "the ramuli . . . or merely squamose, . . .". We presume that, on his specimens, the dried glandular hairs of several uniseriately arranged cells, very common to this group of *Erigeron*, might have been mistaken by him as scales. There is a queer but naturally conceivable coincidence that, even at Nuttall's time, this was "passing as a minute variety of the preceding (*E. canadensis* L.)", just in the same way as it has been in Japan. For many a decade of years in the United States, Nuttall's plant has never been accepted as a distinct species, until very recently only by a limited number of botanists. For example, in 1888, A. Gray still cited *E. pusillus* as synonymous and depauperated form of *E. canadensis* L. in his Syn. Fl. N. Amer. ed. 2: 221.

The purple-tipped involucral bracts that is mostly constant and unchanged in the living and dried specimens for the ready use to identify this plant was first pointed out, as far as we know, by Britton in 1914 in Torreya **14**: 198, who thought that this plant is a distinct species and that a weed of an intermediate kind

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1) Asterisk denotes the new species in his book. The genus *Erigeron* is taken as neutral by Nuttall.

between the two genera like this one should be included in the genus *Leptilon* Raf. However, most later authors took the weed only as a variety of *E. canadensis* L.

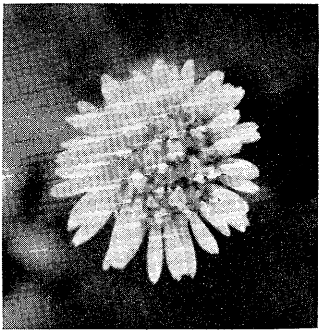

Fig. 3. A head of *Erigeron canadensis* L. with numerous ligulate flowers and a rather few hermaphrodite flowers. In this view, it looks quite similar to *E. pusillus*. ×ca 9. Photo. Tuyama.

Nuttall goes further on in page 149 of his book above mentioned that "the genus *Erigeron*, now comprising 50 species, extending through both hemispheres . . . I am convinced that in this, as in many other natural genera we must seek character under the microscope". Indeed, the diagnostic characters to discriminate *E. pusillus* Nutt. from *E. canadensis* L. should have been sought also under the microscope. The result of our microscopic observations on both species are presented in Fig. 4 and 5 (in our second report) where we see the convincing specific differences between the two.

Concerning the generic name of this plant that is so much confusing up to now, we will for the present to follow the lead of B. L. Burt. He mentions, in Kew Bull. **1948**: 369, 1948, that the use of *Conyza* in sense of Lessing is considered more intelligible and temporarily justified, as compared with that of A. Cronquist, who in 1947, in Bull. Torr. Bot. Club. **74**: 150, has included the Sect. Coenotus of the genus *Erigeron* to that genus. Burt says furthermore that, as the delimitation of the genus *Conyza* is not yet nomenclatorially settled, he will retain the genus *Erigeron* for the plant group of the intermediate nature, including *E. bonariensis* L., *E. floribundus* (H. B. K.) Sch. Bip., and also, we are sure, *E. canadensis* L., and its nearest allies. Of those species as a whole Cronquist calls Sect. Coenotus.

Meantime, Coenotus (originally spelled Caenotus) was first published as an infrageneric subdivision of an uncertain rank of the genus *Erigeron* by Nuttall in 1818 to include both *E. canadensis* L. and *E. pusillus* Nutt., mentioning that the former being, even at that time, "one of the most common of all weed in North America", hence the name Coenotus, that is common or vulgar.

We will next see the Cronquist's view on these two genera. His revised key characters to the genera, *Conyza* and *Erigeron* both in his sense, which were reported in 1943, read in our concerns as follows:

> "*Conyza*: . . . ligules, if present, inconspicuous, shorter than tubes and scarcely if at all exceeding the pappus."

"*Erigeron*: . . . or sometimes with filiform corollas, but then the outer at least with definite ligules equalling or surpassing the pappus."

In both *E. canadensis*, and *E. pusillus*, according to our observations as shown in Fig. 4, all the florets except the hermaphrodite flowers have definite ligules and these are definitely surpassing the pappus. Our plants, it naturally follows, can not be classified under the genus *Conyza* in sense of Cronquist. On the other hand, he says that the affinity of a species in question of an intermediate nature to either of the two genera, should be sought in comparison with the "typical" *Conyza* or "typical" *Erigeron*, using common external appearance as importantly related points, rather than the minute characters mentioned in his key. However, the problem is in that, in making his key, he should have given his mind in the first place to Coenotus because he was to have delimited the two genera more clearly by conjoining Coenotus as a whole to *Conyza*, and also in that there yet exists a controversy in his key as pointed out as above by us concerning the typical

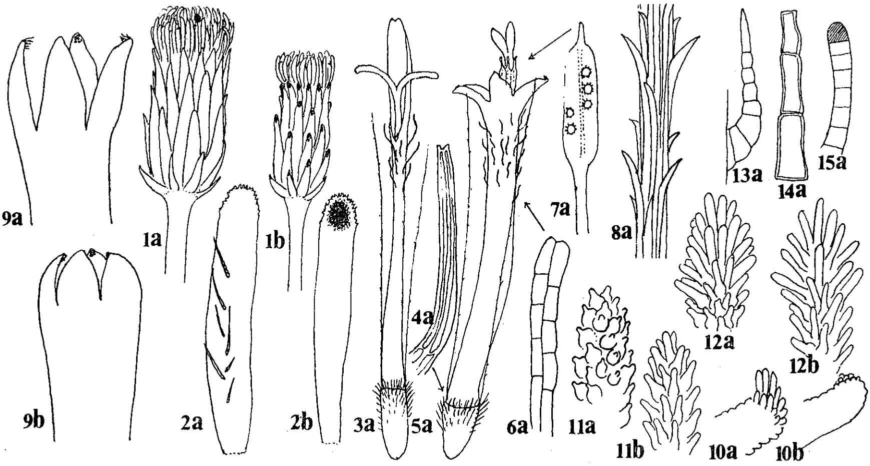

Fig. 4. Various parts of *Erigeron canadensis* L. and *E. pusillus* Nutt.
1. Head, all the hairs removed. 2. Involucral bract, with artificially appressed hairs in 2a. 3. Ligulate floret. 4. Flattened hair on the achene. 5. Hermaphrodite floret. 6. Hairs of the biseriate cells on the corolla. 7. Stamen with pollen grains. 8. Pappus hair in part. 9. Upper part of corolla of the half opened floret. 10. Apical part of the limb of corolla, side view. 11. Papillae of the stylar arms of the pistilate flower. 12. The same of the hermaphrodite flower. 13. Adpressed hair on the stem and leaf, and in *E. canadensis* L., also on the back of the involucral bract. 14. Enlarged part of the same. 15. Glandular hairs on the stem.
In the above figures, a. and b. denote *E. canadensis* L. and *E. pusillus* Nutt. respectively. If there is only a. and not b. for a numerical, it means that the same figure can also be applicable to *E. pusillus* Nutt. In 3a and 5a, two of the pappus hairs are drawn each to show the relative length to the total length of the corolla.

Coenotus, including *E. canadensis* and *E. pusillus* etc.

E. pusillus was for the first time found out by Makino as mentioned above, in 1919 in Japan, at Hongû, Prov. Kii, very warm region facing the Pacific Ocean. Today, however, it is found growing profusely everywhere in the waste land, occasionally in the field or open sandy places along the seashores in the western part of Japan, especially around the big cities like Fukuoka, Hiroshima, Okayama, Kôbe, Ôsaka, Kyôto, and Nagoya. The area includes the more westerly warm pacific side of middle Honshû and also Izu Archipelago, but the weed is not so far invading the neighbourhood of Tokyo. It is inclined to be more tropical than *E. canadensis* L. and, as Makino said, a little late in flowering. But sometimes both species are often established in the same place.

However, characteristic is that, *E. canadensis* is often found mixed with the other weeds in the cultivated field, while *E. pusillus* rather likes the exposed ground, and grows in great abundance, especically along the coast or coastal plain, as is often reported in the United States. It is noticeable, that this weed is distributed in the United States along the warmer coastal region and not in the pacific side, reminding of the distributional patterns of some indigenous plant group that is growing on the eastern side of the United States and in Japan.

E. canadensis	*E. pusillus*
1. Total plant pale green. In long distance view rather yellowish.	1. Total plant satulated green.
2. Long spreading coarse hairs copious on the stem all the length.	2. No hairs as such, if present very few only at the basal part.
3. Cauline leaves prominently acute dentate, especially in the lower ones.	3. Shorter, narrower and entire, or rarely scantily and shallowly dentate in the lower one.
4. Inflorescence as a whole robust.	4. Slender.
5. Primary lateral branch of the panicle numerous and shorter, densely gathered upwards, floriferous all the length, except for the basal part. Seen from the top, before the flower, leaf-blades radiating straightly.	5. Branch fewer in number and looks loosely arranged, more strongly divaricate, up to the half length of the branch non floriferous. Leaf-blades not radiating straight forwards, but usually turned to one side.

6. Head larger. Flowers earlier than *E. pusillus*, that is, maturing in fruit when the latter is still in full anthesis.	6. Head smaller. Later in flowering.
7. Involucral bract larger in size, not tinged with a purplish spot, coarsely hairy on the back in a line, where there is very rarely an interrupted purplish streak.	7. Smaller in size, tinged with a purplish spot at or just below the apex, not hairy on the back.
8. Number of florets per head of a normal or a little smaller size 41–65, including 10–18 hermaphrodite flowers.	8. 31–47, including 6–9 hermaphrodite flowers.
9. Limb of corolla tube subacute oblong, corolla tube slightly constricted below the limb.	9. Obtuse triangular, broader and shorter than the preceding, corolla tube not at all constricted.
10. At the tip on the inner side of the limb, a group of long papillae are projected inwards.	10. A pile of orbicular papillae at the tip inside.
11. Papillae of the stylar arms strongly swollen at base.	11. Not so strongly swollen at base.

The following different topics concerns the weeds belonging to Coenotus, but may worth to be mentioned. However the problem of the distribution of these weeds are not the main theme of this note. I will not go on further. *E. floribundus* (H. B. K.) Sch. Bip. (=*E. musashiensis* Makino in Journ. Jap. Bot. **3**: 31, 1926) is flourishing as weed even as north as Prov. Echigo, while *E. bonariensis* L. is now declining around Tokyo and elsewhere in Japan.

○アラゲヒョウタンボクの無毛変種（大井次三郎） Jisaburo OHWI: A glabrous variety of *Lonicera strophiophora* Franch.

アラゲヒョウタンボクは，北海道から本州の山地に余り多くはないが時々見かけるもので，この類の中では苞が大きいので割合はっきり区別される。成葉の両面，特に下面脈上には開出した粗毛があるが，古く笹村祥三氏は葉の両面に毛のなくなった形のものを採集されて，下記の名をつけてあったが，未発表のままになっていた。今回国立科学博物館で“日本列島の自然”を調査に当って，陸中五葉山に採集し，新しい材料を得ら